# American Journal of Pharmacy

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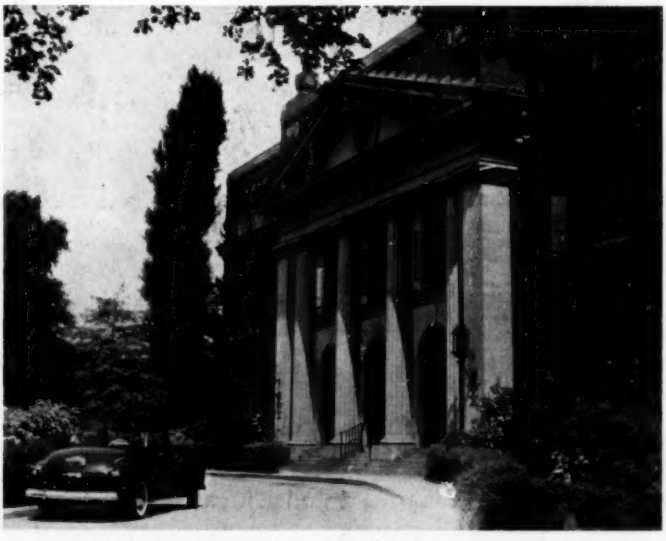

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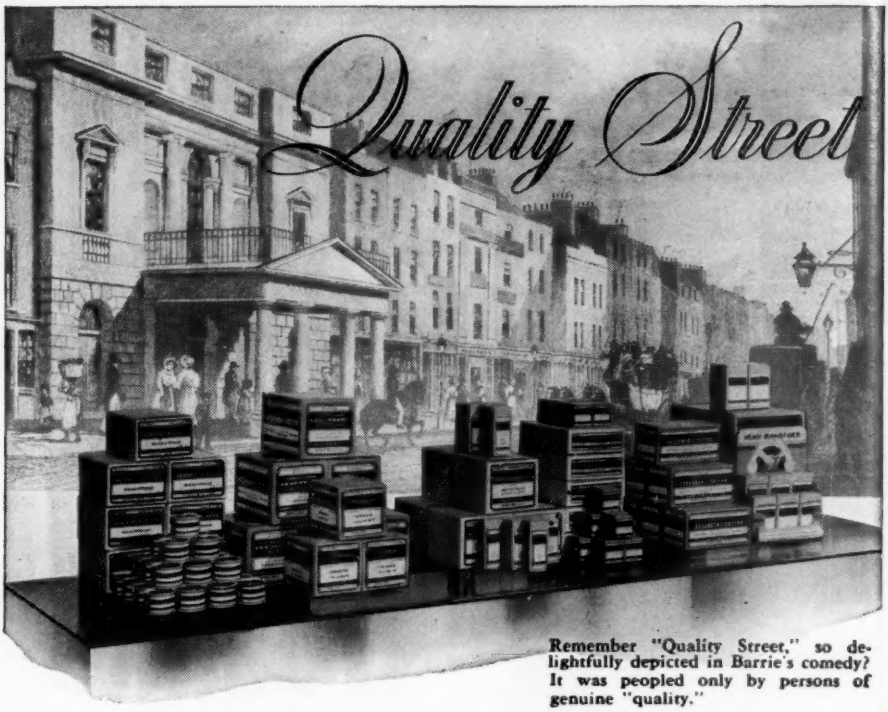


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AND THE SCIENCES SUPPORTING PUBLIC HEALTH

Since 1825



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# THE ONE HUNDRED TWENTY-FIFTH ANNIVERSARY OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE

THIS issue of the AMERICAN JOURNAL OF PHARMACY is dedicated to the proceedings held during the celebration of the one hundred twenty-fifth anniversary of the founding of the Philadelphia College of Pharmacy.

The founders in 1821 took steps that resulted in the first such college in the United States and throughout the years this institution has exerted a profound influence on American pharmacy by means of those men and women who have gone from its halls as practitioners of this ancient and honorable profession. Its graduates have ever been proud to claim P. C. P. as their alma mater and the loyal support of the alumni has been one of its pillars of strength during those times when many weaker institutions went into oblivion.

Today the College stands not with eyes fixed on the past, glorious as that has been, but on the future. Having long since expanded its teaching facilities to include the related schools of chemistry, bacteriology and biology, it is prepared to meet the challenge created by an aroused interest in public health on the part of all the people of the world.

It is our intent to remain a free institution without the realm of political dictation. To do this requires the continued faith and support of those to whom liberty and freedom are of fundamental importance and not loose expressions to be sacrificed on the altar of expediency. The AMERICAN JOURNAL OF PHARMACY, published since 1825 through the support of the College, enjoys a unique freedom in its editorial policy; a freedom granted it by its mother organization since its inception. Thus we are not bound to publish material benefiting the college nor to deny our pages to critics or other colleges. Frequently articles are published which are contrary to our opinion and that of the college administration but this is the very essence of democracy and freedom. To stifle such expression of honest conviction would endanger even our own existence.

We are happy to salute the Philadelphia College of Pharmacy and Science on this its anniversary and to express our confidence in its future.

# EDITORIAL

## THE BIRTH AND WORTH OF AN INSPIRED INSTITUTION—1821-1946 *

THIS issue of the AMERICAN JOURNAL OF PHARMACY is devoted called the Philadelphia College of Apothecaries, was founded at historic Carpenter's Hall, February 23, 1821. It was the first such institution in the western hemisphere.

One of the proud statements frequently heard in connection with modern developments in many fields is that youth initiated the enterprise. One learns then, with some surprise, that the founding of the Philadelphia College of Apothecaries was also an enterprise of youth for the average age of the quintet, whose ages we know was but twenty-eight years at the time of the founding, the oldest being Samuel Jackson, who was thirty-four and the youngest, Peter Williamson, who was but twenty-four.

The college was founded in the serious-minded days of Quaker Philadelphia as an independent institution specifically dedicated to the formal instruction of apothecaries and it carries to this day marks of its early characteristics for no one who knows the story of the progress and policy of the institution can deny its stolid dignity nor feel that it has, at any time, belied its conservative inheritance.

At one time it was the lone institution serving American pharmacy and now, reaching its 125th anniversary, it notes with satisfaction the important part it has played in serving the various interests of pharmacy in the colleges, in retail practice and in the great pharmaceutical industries. Alumni trained in its halls have served in every corner of the earth; and many of the illustrious public servants in the diversified fields of pharmacy are or were alumni of the college.

Great changes have come to pass in the practice of pharmacy since those early days when the worthy druggists and apothecaries of the City and Liberties of Philadelphia organized themselves into a corporate college. Existing conditions in the then unorganized pharmaceutical field inspired them to take action in the light of their

* This editorial was contributed by Dr. Ivor Griffith, President of the Philadelphia College of Pharmacy and Science, and former editor of this Journal.

deliberate judgment and to establish an institution whose example and labors have been of inestimable value in the development of the profession in which they were engaged and in serving the public as well. The frauds and errors and un-understanding then obtaining in the drug business in America were the impelling factors that brought these decent men together in an effort to eliminate such practices and develop pharmacy into its logical channels of service.

It is quite correct to mention that the founding of this institution was the single outstanding event responsible for influencing the development of an entire calling. From the beginning, the roster of the officers, the faculty and alumni of the college reads much like a "Who's Who" in American pharmacy. The original professors were the first of an illustrious line of which not only the college but the professions of pharmacy and medicine may be justly proud. Thus, during the first century of the college the following names are those of professors of Pharmacy, Materia Medica and Chemistry—Jackson, Troost, Ellis, Wood, Bache, Eglesfield Griffith, Fisher, Bridges, Carson, Thomas, Parrish, Procter, Maisch, Remington, Sadler, Ryan, LaWall, Cook, Stroup and many others.

The American Pharmaceutical Association had its beginnings here and to a degree the American Association of Colleges of Pharmacy. Over 12,000 servants of society in the health sciences have left the halls of the institution and over 7,000 living alumni are serving in the best traditions of their Alma Mater.

Actually, the inspiration growing out of this celebration of the founding of pharmaceutical education in America should be of sufficient magnitude and of such potent influence as to be an enduring foundation for renewed energies to reach the eminences of service and accomplishment that still lie ahead.

IVOR GRIFFITH.

# THE INFLUENCE OF THE QUAKERS ON PHILADELPHIA INSTITUTIONS

By George Urdang, Sc. D.*

A PHARMACEUTICAL institution of learning, the oldest of its kind not only in the United States of America but in the whole of the English speaking world, celebrates its 125th anniversary. Common usage would dictate, at least for the first address to be delivered on this memorable occasion, a eulogistic survey of the history of the Jubilarian. Instead, the men responsible for the organization of the celebration assigned to this speaker a topic reaching far beyond the history of the College as such: The Influence of the Quakers on Philadelphia Institutions.

Not a word in this title points to the Philadelphia College of Pharmacy and Science. It simply and proudly has been included in the collective term "Philadelphia Institutions." Hence the task assigned to this speaker is not as much to show the indebtedness of this College to members of the singular Anglo-Saxon spiritual movement called Quakerism to which the world owes so much, as to give an idea of the influence of the Philadelphia Quaker druggists, who founded the Philadelphia College of Pharmacy 125 years ago, on other Philadelphia educational institutions.

The founders of this College were professionalists as well as humanists. As professionalists they felt themselves entrusted with the task to open the way to professional progress. As humanists they felt themselves obligated to support human progress in general. Thus in this City of Brotherly Love at the early nineteenth century, there developed a general intellectual and moral atmosphere of which pharmacy was an integral part, contributing to it as well as benefiting from it.

It is well known that the early and even the later interpreters of the Bible and those who translated the Holy Book into the vernacular often stumbled over the difficulty of explaining what was "in the beginning." Was it the word, was it the action of the Lord? I am inclined to say in the beginning was the definition. How can

* Director, American Institute for the History of Pharmacy.

one, with some certainty, do anything without knowing what one is going to do.

Thus let us first define the term "professional progress" before we go any farther. It is quite an intricate term. Progress, that word is easily understood. It designates everything going up and not down the hill, every development to, or state of, greater perfection, independent of the means by which this development or state has been achieved.

But "professional progress," that is different. It raises the question of the limitation imposed upon the sweeping concept "progress" by the adjective "professional." It is a limitation as to the ways in which progress is achieved rather than as to the goal of perfection itself.

Progress in handicrafts and arts can be achieved by the accumulation of empirical experience only, although it may be helped by learning. With progress in the professions, and the sciences on which they are based, it is just the other way around. It can be achieved only by learning, although it may be helped by empirical experience.

*It is through education that the professions originated, and it is through progress in education that what we call "professional progress" comes about.*

Seen in this light, the deed of one hundred and twenty-five years ago which we are celebrating today gains a still greater importance than has been generally accorded to it. In organizing in 1821 the first School of Pharmacy on American soil as one of the lasting responsibilities of the local pharmaceutical association which they had founded only a few weeks earlier, the Philadelphia pharmacists had laid the groundwork for something of much wider scope and meaning which had not been in existence heretofore, an AMERICAN PROFESSION OF PHARMACY.

There is no doubt as to the fact that those instrumental in the movement leading to the founding of the Philadelphia College of Apothecaries—the name was changed to Philadelphia College of Pharmacy one year later, in 1822 *—were men of strong convictions. It would have been so easy to accept the offer of the University of Pennsylvania which would have given to the Philadelphia pharmacists,

* From now on the term Philadelphia College of Pharmacy will be used exclusively.

their clerks and apprentices, an opportunity to attend courses as the Faculty of Medicine thought adequate, and would have submitted pharmaceutical education to the judgment of this Faculty. It required foresight as well as courage to see the need for, and to insist upon, a development of pharmacy in its own right and on its own responsibility. The question arises, who were these men of conviction and determination with whom Providence blessed American pharmacy at this crucial period of time?

It is common knowledge that Philadelphia, the "Holy Experiment," was founded by William Penn as an attempt at giving the ideals of the Religious Society of Friends, commonly called the Quakers, a substantial basis for proving their value and practicability. Wherever we open the books on the history of Philadelphia, we encounter Quaker activities and Quaker influence. The founding of the Philadelphia College of Pharmacy does not offer an exception. Its main initiators were Quakers, and it is doubtful whether the idea of a school of pharmacy would have been received so favorably, realized so quickly, and maintained so stubbornly, had it not been for the fact that, as William Penn put it, "Friends consider education as a right and a privilege." We may well add another quotation, testifying to the tenacity of the Quakers in pursuing what they think to be right:

"They [the Quakers]," says Struthers Burt, "are stout folk with a good deal of hidden choler. Wrestling with the 'spirit' seems to make them as strong, not to mention obstinate, as wrestling with the angel did Jacob." (1)

It is very unlikely that men of this kind should limit the realization of a principle so deeply ingrafted in them to only one case which happens to be connected with their own trade. Indeed, quite a number of Philadelphia educational institutions were helped to their existence or as to their maintenance by the same people who were instrumental in the founding of the Philadelphia College of Pharmacy.

One example stands out particularly: the Apprentices' Library of Philadelphia which its historian, John Frederick Lewis, calls "the oldest free circulating library in America" (2). The young pharmacist and Quaker, Daniel B. Smith (1792-1883), was one of the "three worthy Friends" who in 1820, i. e. one year before the founding of the Philadelphia College of Pharmacy, decided to organize this library in order to disseminate knowledge among those learning

a trade by putting at their disposal well-chosen books for home study. Among the other founders who joined the three initiators was the pharmacist, Quaker and co-founder of the Philadelphia College of Pharmacy, Henry Troth (1794-1842). Smith was elected the first Secretary of the new educational venture. Troth, being one of the Managers from the very beginning, became in 1839 its (third) President.

The Wetherills, of whom three, all of them Quakers, are listed among the founders of the Philadelphia College of Pharmacy, finally, have made the Apprentices' Library of Philadelphia a part of their family responsibility in the same way as they did with the College of Pharmacy. Throughout the pages of the *History of the Apprentices' Library* we encounter the one or the other member of the family in the one or the other capacity.

There is furthermore a passage in the *History of the Apprentices' Library of Philadelphia* reading as follows:

"One woman signed the articles [of the constitution of the Library], Elizabeth Marshall, the granddaughter of Christopher Marshall, the diarist. She was the daughter of Charles Marshall and Patience Parrish, his wife, and was born in 1768" (3).

The father of this remarkable woman, the Quaker, Charles Marshall (1744-1825), is listed among the founders of the Philadelphia College of Pharmacy. At that time he was seventy-seven years of age and was elected the first President of the College not as much for the activities expected of him as for his past merits and as the bearer of a name famous in Philadelphia pharmacy for about a century. It was his daughter Elizabeth who since 1804 conducted the family drug business. In acting as one of the founders of the Apprentices' Library she certainly represented the old man as well as herself.

The immediate success of this educational venture is remarkable. "More than 10,000 young persons," tells a *History of Philadelphia* published in 1839, "principally apprentices, have partaken of its benefits, and in many instances known to the Managers, with great and important influence, in originating and developing talents, and good character in after life" (4).

This was the aim of the leading originators of the Philadelphia College of Pharmacy in whatever institution they helped to promote: the development not only of talent but of good character likewise. It

is no wonder, therefore, that an educational Quaker venture devoted especially to the purpose of endowing young people with a fireproof amalgam of knowledge and character, the Haverford College, was given the most active support by founding members of the Philadelphia College of Pharmacy. Daniel B. Smith belonged to the men who in 1830 organized the Haverford College, named originally Haverford School, and became one of the trustees. In this latter capacity he was joined by another founding member of the Philadelphia College of Pharmacy, Edward B. Garrigues (1795-1889). Smith was, however, unequalled by anyone in his devotion to the work which in his opinion had to be done, and the example that had to be set, by the Haverford College.

"It was," says Anna Wharton Wood, "Daniel B. Smith who, by common consent, was recognized as giving Haverford its tone and building up the young school into a really worthy educational institution" (5). For fifteen years, from 1834 to 1849, he resided at Haverford teaching moral philosophy, English literature and chemistry and acting as the school's principal from 1843 to 1846. The idea behind it, the concept that a good general education is the necessary framework for special professional education had been practiced, more or less unconsciously, by the apprentice Daniel B. Smith. Having just started his pharmaceutical apprenticeship, the seventeen year old lad wrote to his cousin Margaret H. Smith as follows:

"The fact is I read whatever I meet with, and a catalogue of what I have perused would be a mere Hodge-Podge, a Farrago of inspired verse and stupid Prose. I employ myself spreading plaisters, selling drugs and lounging about the Shop where thee will find me at any time with the productions of every quarter of the globe, and at thy most humble service" (6).

It was this omnifarious reading based on a burning thirst for knowledge that enabled Smith to meet the duties of teaching in such varied fields and to meet them well. His conviction that very often it is not lack of talent which is retarding progress but lack of easily available adequate instruction made him a promoter of almost every educational project of greater importance in the Philadelphia of the first half of the nineteenth century.

In 1824 Daniel B. Smith was one of the nineteen individuals who were instrumental in the founding of the Pennsylvania State Historical Society, and in the following year, at the inaugural meet-

ing, he was elected the Society's first corresponding Secretary. Likewise in 1824, he was a charter member of the Franklin Institute. He was furthermore a member of the American Philosophical Society and of the Philadelphia Academy of Natural Sciences.

Daniel B. Smith was not the only founder of the Philadelphia College of Pharmacy who played a part in the development of the Academy of Natural Sciences. The very name of the Academy had been suggested by the physician and druggist, Dr. Samuel Jackson (1787-1872), who had taken a part in forming the Philadelphia College of Pharmacy "as a link between the professions of pharmacy and medicine" (7) and became the first professor of materia medica and pharmacy in the College. Jackson's colleague in teaching at the College from 1821-1822, the Dutchman, Dr. Gerard Troost, was not only one of the founders of the Academy but even its first President, serving from 1812 to 1817. It is certainly not without significance, finally, that the spiritual father of the Academy, John Speakman, Jr., was the son of a Philadelphia druggist ("at the northwest corner of Second and Market Streets") and that the meeting at which the founding was decided upon was held in the house of his druggist father (8).

There was one famed Philadelphia learned society which originated in the first third of the nineteenth century, in 1814, apparently without Daniel B. Smith participating either in its founding or in its later development: the Athenaeum. It may be that the name and the ideology of this somewhat esoteric institution, both derived from the main seat of pagan wisdom, Athens, did not appeal to the religious sentiments of the convinced Quaker that he was. Anyway, the gap was filled by another founder of the Philadelphia College of Pharmacy who was not a member of the Religious Society of Friends and took a very active interest in the Athenaeum: William Lehman (1779-1829), first Vice President and second President of the Philadelphia College of Pharmacy.

"Upon his demise William Lehman left a bequest of $10,000 to the Philadelphia Athenaeum 'for the construction of a suitable building. . . . The legacy was prudently invested and with it and its accretions the directors were able to erect in 1847 the edifice which this famed institution still uses in Sixth Street below Walnut Street" (9).

In a paper dealing with the Centenary of the Pharmaceutical Society of Great Britain which I presented before the American Pharmaceutical Association Section on Historical Interests, Detroit meeting, 1941 (10), I pointed to an amazing analogy between the types of men who in the United States and in the United Kingdom led the movements to better the profession of pharmacy and its services through association and education. Indeed, the prominent English pharmacists who in 1841 founded the Pharmaceutical Society of Great Britain were the true brethren of their Philadelphia colleagues of twenty years earlier. They too were Quakers, and like their American co-religionists, they took part not only in the philanthropic but also in the educational issues of their time. There was William Allen (1770-1843), elected a Fellow of the English Chemical Society in 1794, of the Linnaean Society in 1801 and of the Royal Society of Great Britain in 1807. He was furthermore one of the founders of the British Geological Society and, as one of the most active and influential philanthropists of this period, the friends of Kings and Emperors. There was Daniel Bell Hanbury (1794-1882), Allen's companion as sectarian, scientist and philanthropist as well as in business, and the father of one of the world's greatest pharmacognosists, Daniel Hanbury (1825-1875). There was, finally, Jacob Bell (1810-1859), elected Member of Parliament, and one of the selected members of the intellectual English world of his day.

It is evident that it was not motives of personal ambition or aggrandizement which caused these men, in Philadelphia as well as in London, to establish the pharmaceutical institutions which owe to them their existence. They did it for the others, not for themselves. "The motive of these men in creating professional pharmacy," I said in my paper, "was their feeling of responsibility toward themselves and toward the tasks to be fulfilled by pharmacy for the sake of public welfare."

Such convictions, held by professional people, warrant both general as well as professional progress. They are incompatible with standstill of whatever kind. The Philadelphia College of Pharmacy, owing to these ideas its origin as well as its maintenance for one hundred and twenty-five years, is bound to them by historical as well as by practical necessity. It has been fortunate in having the men imbued with the convictions concerned, and able to realize them, in the past. May it never lack them in the future.

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## SCIENCE TODAY AND TOMORROW

By Roy K. Marshall, Ph. D.*

TO presume to summarize correctly the science of today and to predict the trends of science in the future is beyond my capacity but I can yet say much of what science of today and tomorrow must be. We who work in science in such institutions as this belong to a select group of humanity. We owe so much to those who have gone before us; we have so much that we must pass on to those who will come after us. Our responsibility is very great.

The careers of those of us who take refreshment from the fountain of science depend upon whether we sip and hurry by or drink deeply of the waters. Some of us must be the technicians who labor without seeking or receiving great public recognition and honor. These are the ones who, behind the scenes, make it possible for some others to say, "We tried this, and we found that it would work." They are the unsung heroes of science.

There are those who must direct research, telling these technicians what to do and, very often, reaping the major share of the glory for accomplishment. Only they can pass along to the workers who make great accomplishments in science possible—new wonder drugs, new gadgets—only they can give their thanks and the gratitude of the world.

Who should be scientists? Not those who are looking for a job that keeps them busy from nine 'til five, yielding a comfortable living. The rewards for science are becoming more concrete; a scientist can now earn a living that makes it possible for him to indulge his family with such luxuries as those that have been within reach of day laborers for many years past. But certainly those who can treat a scientific position as a job of work done for pay are not the proper candidates for the scientists of today and tomorrow.

I am a constant radio listener. I believe radio has a great destiny in carrying information in palatable form to millions who otherwise would never be subjected to it. Only a few days ago I heard a dramatized broadcast of the life of Samuel F. B. Morse, the inventor of the electric telegraph. Even after making allowances for ex-

* Associate Director, Franklin Institute.

aggerations for dramatic effect, there was something about that broadcast that brought a lump to my throat and a mistiness to my eyes. The thought that this portrait painter had a vision that was sound, and that came to fruition through persistence in spite of obstacles, is enough to bring to a scientist, it seems to me, a thrill of sympathy and of pride in belonging to such a breed of men. Unless in reading or hearing the stories of the lives and accomplishments of scientists of the past there is this lump in the throat and mistiness of the eye, one should not be a scientist. Unless there is a firm grasp of the history of science, much of the incentive that should be present will be missing and the prospective scientist will become less than he should.

There is ever need for inspired teaching of science. The good teacher is one who is so imbued with the spirit of science that facts are of secondary importance; the philosophy behind scientific research is the phase to emphasize, not the ponderous accumulations of facts. One definition of science is that it formulates general laws that include millions of miscellaneous observations. Integrity in the handling of these observations, without blind worship of facts, is always needed; broad vision to see through to some point of summation is even more important. The good teacher will inspire his students with the confidence without arrogance that has been the motivation of all great scientists. A story, probably apocryphal, is told of many men, among them Faraday, who invented the electric motor. As the King and his party visited his booth at an exposition where he had his primitive motor operating, Faraday was asked, "But what good is it?" Faraday's reply was, "What good is a baby, Your Majesty?"

To a scientist, there must be no such thing as a bad fact. Every fact of nature, every phenomenon and its result, must be useful to mankind. There is little profit, usually, in trying to force the issue; the goodness of the fact will be manifest in due time. The very word "science" comes from the Latin verb "scio," which means "I know." Those who keep in mind that science is truth and that truth can never be wrong are well on the way toward appreciating the fundamentals of what it takes to be a scientist.

We can sharply divide the period of the past from that of the future, because on July 16, 1945, at about 5:30 A. M., there was set off the first device to yield atomic energy in practical quantities.

That it was an atomic bomb, instead of an atomic power plant, is an accident of the times. Without the urgency of wartime needs, the successful release of nuclear energy might have been delayed by a generation or two. Now that it has been accomplished, we have in our possession the power to destroy our fellowmen by the hundreds of thousands or to bring life and happiness to millions throughout the world.

There is within our grasp the possibility of applying our knowledge of the nucleus of an atom to the alleviation of much of the suffering of mankind. Even before all the scientists skilled in this work were banded together into the effort to produce the world's most potent military weapon, there was much promise from the work. In the cyclotron of E. O. Lawrence of the University of California enough atomic transmutations had been accomplished to show us that we could remold the materials of nature nearer to our needs.

As an example, I may mention the production of artificially radioactive isotopes of the common elements. Every element of the atomic table has now been made radioactive, some of the elements in the form of several isotopes. The use of these man-made isotopes as tracer elements is going to be of inestimable value. When radioactive iodine is ingested, its progress can be followed with a counter sensitive to the radiations that are constantly emitted. It is learned that within only a few minutes the iodine has reached the thyroid gland, and in another few minutes more than half of it has passed out of the thyroid. To treat hyperthyroidism, then, a large dose of iodine must be taken initially, then smaller doses must follow, to maintain the concentration. Until these radioactive atoms of iodine could be produced, no one could know how fast the absorption and elimination of iodine took place in the thyroid.

With X-rays or the gamma rays from radium, various portions of the body can be treated, as for example for cancer. But always, in using these two forms of radiation, normal cells are subjected to the same lethal effects as the undesirable ones, a fact that severely restricts their use in certain applications. Now, however, we can prepare radioactive isotopes that chemically are indistinguishable from the natural forms of the elements; they form the same compounds and pass through the same changes as they take part in the metabolism of the animal organism. Think what this means, with

respect to the dreadful "incurable" disease of leukemia. We know that phosphorus is selectively taken up by bone marrow and the white blood cells. We know, too, that radioactive emanations destroy white blood cells. If, now, we wish to destroy the enormous excess of white blood cells that occurs in the disease leukemia, we can make a radioactive form of phosphorus that will form a compound such as an ordinary phosphate, administer it orally, and find that the white blood cell count goes down. Repeated doses will bring the count down from, say, the abnormal value of 200,000 to something about 10,000, nearly normal. How lasting this effect is, no one as yet can say.

The benefit to be derived from artificially radioactive materials is even greater because of the short half-life of most of these materials. The patient can know that within a few days or a few weeks there will be no lingering radioactivity in his body. He can be assured that only those tissues which must be treated are subjected to the treatment; the selective absorption by certain tissues of certain materials guarantees this. Phosphorus in the body is absorbed particularly by those cells undergoing rapid mitosis, a fact which points to a new method of treatment for cancer. Cancerous cells are identical with normal cells, except that for some undiscovered reason they grow and multiply more rapidly than they should. They will take up phosphorus during mitosis and will be destroyed if the phosphorus is radioactive.

There is enough work in this field, so greatly widened by the researches concerned with the manufacture of the atomic bomb, to keep a generation of scientists busy constantly, selecting those materials and techniques that will be useful, rejecting those that are useless or too dangerous. But in this topic lies one of the less promising aspects of the science of the future.

About two months ago I attended a luncheon in New York, as a prelude to an afternoon session at which several speakers from the fields of the humanities, modern literature, the social sciences and the natural sciences (my contribution was here) talked about the problem of presentation of their materials to the general reader. At the luncheon, a business man and financial expert, Mr. Beardsley Ruml, entertained us with a story. "People are always asking me," said Mr. Ruml, "what the prospects will be for business in 1946 and 1947. My reply is that I am organizing a local chapter of the L. A. I. C.

Of course," he continued, "I am always asked what in the world the L. A. I. C. stands for. Then I tell them that it means 'Lord, am I confused!' "

Well, when I look upon the present moment in science, I am inclined to set about organizing many local chapters of the L. A. I. C. When the atomic bombs fell on Hiroshima and Nagasaki, the impacts that brought so much destruction and so much suffering and death were followed by impacts upon the social consciousness of many of our fellow citizens. A wave of hysteria swept across the country—indeed, throughout the world. What effects would the atomic bomb have on the problems of international relations? What would need to be done to protect our "secrets" of extraction of energy from atomic nuclei? What restraints must we impose on science, to prevent wasting the military potentialities of this great new weapon?

This matter of "secrets" is one that has brought a violent clash of opinion between the scientists on the one hand and the military authorities on the other. I am somewhat naturally biased in my opinion that the scientists know what they are talking about, and when the statements of military authorities are opposed to those of the scientists who accomplished the feat I have little difficulty in making up my mind as to whose statements I shall believe. Especially do I feel that they do our nation poor service when the military dictators of the nuclear physics projects say that we can hold our "secrets" and delay the production of atomic bombs by other nations by five, ten or twenty years. They lull the ignorant and unthinking masses of our people into a sense of false security; they permit only one inference to be drawn, that we have a monopoly on brains in this nation.

When we scan the names that are emblazoned in letters of gold on the scroll of scientific achievement in the past, we find that every nationality in the world has been represented. We need look no farther than the roster of names of those who participated in the famous Manhattan Project. Einstein the German, Chadwick the Englishman, the Curies and the Curie-Joliots of France, Szilard the Hungarian, Bethe the Austrian, Hahn and Strassman, Frisch and Meitner of Germany, Bohr of Denmark, Fermi the Italian—these are only a few of those whose isolated discoveries, massed together, have given the world the power to release nuclear energy. It has been ever thus in science; it will always remain true. Principles of nature

can not be nationalized; the law of gravitation works in China as well as in Africa and Scandinavia. In every land today there are capable scientists who can synthesize solutions of problems from the raw materials of laws and miscellaneous observations of nature. We dare not be arrogant and assume for a moment that any so-called "secret" can be anything more than merely "unpublished."

Nor do we dare risk not knowing how much our "enemies" know, that we do not know they know. At this moment there may be rising in the Soviet Union, or in France or Sweden, a genius who will far surpass any individual who, at the insistence of our military leaders, is forbidden to release what new knowledge he has gained through the researches directed toward the achievement of the atomic bomb. We stand to lose far more than we retain, by our insistence that even the basic scientific principles discovered shall remain secret. We foster a reciprocity of fear and secrecy that is contrary to all the ideals of science. We encourage a dread that at any moment our new-found knowledge will be used to destroy others.

The demands by certain of our military authorities that all researches in the development of atomic energy, past and future, must be held solely at the disposition of our military establishment can be the death knell for the scientific future of our nation. They can work to defeat the improvement in the health and happiness of all mankind. They can work to make war a constant state of the world; we have already publicly served notice on the rest of the world that if they are wise they will arm to meet the threat of the atomic bombs which we have manufactured and continue to manufacture.

When we can begin to forget the phrase "atomic bomb" by constant use of the expression "atomic energy" we shall be on our way to the real beginning of what has been hailed as the "Atomic Age." There must always prevail that internationalism of science that has often been the only bright spot in the picture of man's relations to his fellowmen. There must prevail a free and full flow of scientific information across national boundaries. There must be free and full discussion of scientific material in the class room, without fear that a gestapo, by whatever name, can intimidate or imprison a man of science for saying or thinking what he pleases about the scientific principles that must inevitably be known to scientists of all nations. There must be no secrecy that will force repeated discovery of the

same principles even in different laboratories in the same country. The progress of science must not be hampered by the desire of a few to impose military rule in a nation to which such a rule is so foreign as it is in ours.

Science tomorrow must be guided by the same high principles of honesty that have been handed to us by our scientific ancestors. Each in his turn makes his contribution, large or small; the sum of these contributions is passed on to our descendants as part of our payment of the debt we owe to those who went before us. Science is, in a sense, an aimless thing. We observe, we collate and, once in a great while, we stumble on a simple law that binds together a great mass of information. We dare not ever say that because we do not see immediate practical application we should abandon some certain path of investigation. As long as facts accrue, we must continue along all lines. No tyranny of the spirit must deter us from the pursuit of truth. Science in the future must be ever more full and free.

In his magnificent volume entitled "Watchers of the Sky," the poet Alfred Noyes has put it well:

"Day after day the slow sure records grow, awaiting their interpreter;
Who that once has seen how truth leads on to truth can ever set a bound to knowledge?"

## THE AGE OF RESEARCH IN SCIENCE

By George D. Beal, Ph. D.*

WHEN the word "research" is on every tongue, it seems trite to speak in general terms on this subject for even one minute. It is not unlike Mark Twain's famous comment on the weather, "Everyone talks about it, but nobody does anything about it." Congress does not know whether to regulate it or promote it. Some will socialize it by withdrawing patent protection from the results. Some persons have gathered the idea that research is an inner sanctum in education, some even think that we ought to have some in our colleges of pharmacy.

In my work we talk about research six days in every week, and think of it the seventh instead of resting. But our talk is of budgets, programs, experiments, reports, personnel, pilot plants, etc. If I go out of my way to talk about it, I could be boring my listeners by talking shop. However, one of the deadliest thoughts that any professional person, especially a teacher, may have is that the thing so commonplace to him must be equally familiar to every other person.

During the sixteen years that I have worked with Professor Cook on Pharmacopœial revision, it seems that we have spent most of our time on matters of definition. That is, we do our best to express our desire with such simplicity that chemists will agree on its application and lawyers on its interpretation. Therefore I am not looking for new worlds to define, but only for a reasonably tangible boundary for my field. Most persons have a sense of curiosity. Let us say then that research is an attempt to satisfy that curiosity by thoughtful means.

Thirteen years ago I had the honor of addressing you on this anniversary. I might quote briefly from that manuscript. ". . . Today many allege that the products of technology are not an unmixed blessing, that the feast has become a surfeit, and that recovery can only take place after scientific treatment. Grave proposals are made for scientific holidays, for moratoriums in research, for the replacement of financial credits with thermodynamic credits." Some of you at least must remember "Technocracy." Those who would put a stop to all study of atomic and subatomic phenomena because

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its results may conceivably have subversive uses would no doubt have clamored, and some possibly did, for admission to that school. But the general cry now is for more research, the question being how it shall be financed, administered and applied. Most of the people who worry about research have never engaged in any, have an exaggerated idea of how and what it can produce, and, in general, would not know it if they met it coming down the street. The public worry is probably aroused by, first, some fear of misdirection, and, secondly, some fear of misappropriation.

Except for political spellbinders who use "soak the rich" arguments as bait, the public is probably not too much worried about our patent system, although perhaps too placid about the need for safeguarding it. But they do fear misdirected uses. The spear, the bow and arrow, and gunpowder were all in their time materials of warfare. They were also tools of the chase to obtain food. The airplane can bomb cities, torpedo ships, strafe trains, and in every sense be a hellish medium for exhibiting all of the pervertedness of which mankind is capable. Used for the transport of mail and passengers, it brings London as close to Philadelphia as the Pennsylvania Railroad can bring Pittsburgh.

Should we proscribe the manufacture of nitric acid or ammonia because some nitro compounds and ammonium nitrate are violent military explosives? If we do, then we wave farewell to our synthetic dyestuff and drug industries, and reduce the supply of nitrogenous fertilizers to animal excreta and the Chilean nitrate which are end-products of their oxidation, a supply altogether too small to produce food for our expanding population.

A very good friend, one whose attitude towards moral things was utterly devout, asked me during the time of the late noble experiment of prohibition why we even made alcohol for industrial or pharmaceutical uses. Surely, she said, there must be things that would take its place. The scientific and technical need for these things which may be improperly diverted is absolutely incomprehensible to the lay mind.

Our politicians, and many editorial writers, are fond of talking of the matchless natural resources of America. Those natural resources were here before the Aztecs, the mound-builders, before Columbus, and Verrazano, and the Pilgrim Fathers. None of these persons found a rich and booming United States. When William

Penn made his treaty with the Indians he was not thinking about fabulously rich coal lands in Western Pennsylvania to be acquired for a song. These things only became of value after people had dreamed about them, and others had experimented with them, and still other men, with the good faith that lies at the bottom of sound business, had provided the financial support to erect the pilot plants and production units necessary before any kind of a market could be developed.

Every basic industry has at the bottom some process of extraction, whereby a raw material is freed from its accompanying gangue. It may be as simple as the smelting of iron ore, or as complicated as the extraction of penicillin. The smelting of iron ore represents nearly the ideal in utilization of natural resources. Starting with an ore comprising almost exclusively iron oxide and sand, and adding thereto coke, limestone and air, there come from the furnace pig iron, slag and blast furnace gas. Although there are slag dumps, the bulk of all slag goes as road ballast, concrete aggregate, or as a substitute for cement rock in the manufacture of Portland cement. The blast furnace gas furnishes motive power for the blowing engines, fuel for the stoves in which the air blast is preheated, and fuel for the burning of the cement. The dust from the furnace is collected, sintered and charged over again with the ore. In addition to the coke, produced in by-product ovens from bituminous coal, the coal yields ammonia, organic bases, phenols, benzol and higher hydrocarbons, pitch and fixed gases which themselves are used for fuel. So complete is the balance that, except for some waste heat and some loss by leakage, the only losses are nitrogen from air, and carbon dioxide representing the ultimate combustion of carbon.

Not all iron ore has the desired purity, and it, the coal and the limestone may contain undesirable impurities. Research has first been necessary for overcoming the effects of the usual impurities. In our utilization of natural resources we have first of all used those of highest purity commercially and conveniently available. Industry that uses natural resources must eventually contend with diminishing quality. Either the purity becomes lower, or interfering materials more frequent, or the source of supply becomes more remote as local supplies are exhausted. Any economic situation that increases demand creates more industrial problems. Consequently research must either improve production methods to reduce the cost, or must de-

velop a method of beneficiation by which a low-grade ore may be concentrated before shipment from the mine. As an example, with the high-grade bauxites approaching exhaustion, alumina-bearing clays of lower purity must be refined for aluminum smelting. The Aluminum Company of America through its comprehensive research program has developed these processes. When it makes them available to its competitors, it finds that the greater the production of aluminum, the more aluminum conscious becomes our public, and the greater becomes the demand for aluminum, while the cost of aluminum production, like so many other commodities, is reduced as the production volume increases.

At the other end of the scale we have those substances of low content, small yield, and complications of extraction. Today's best known example is penicillin, where a fermentation plant equal in capacity to a large distillery furnishes relatively few grams of the antibiotic. Here research must be directed towards nutrition of the mold, towards selection or development of strains of mold characterized by larger yields, and toward refinement of the extraction problem for the improvement of yields and purities.

There is no excuse for war. Yet it became apparent in World War I, and has been emphasized during World War II, that all-out wars through the creation of emergencies do catalyze research and development along benevolent as well as homicidal ways. The clear zones that surrounded Fleming's penicillium colonies had indicated the excretion of an anti-bacterial agent by the mold. Eventually a biochemist with adequate curiosity and time, perhaps stirred by failure of some already known anti-infective, would have made an effort to isolate, identify and apply the agent. During the first great combat great strides were made in the topical treatment of infections by chloramines. The sulfonamides coming just before this war stimulated further research on systemic anti-infectives. Lacking great national need, thirty years might be a reasonable estimate of the time that would finally have brought penicillin to the market. Only the stress of global conflict could bring together the best of all scientific minds, and break down the barriers of industrial competition to make possible the combined effort that leads the way to this victory of science.

Research in scientific fields began in universities. At first only a monastic, cloistered atmosphere was thought suitable for deliberation. It has been a hard fight to convince many industrialists of the

practicality of research men and their ideas. No doubt analytical chemistry, which puts precise scientific procedures to practical use, gave science its first endorsement as an adjunct to business. The analytical laboratory almost simultaneously became an industrial tool in the pharmaceutical and the steel industries, two industries in which America leads the world. As far as I can determine, the first chemically standardized drug preparation was an extract of ergot, and we know that a similar preparation was the first to be biologically assayed. Interestingly, both standardizations were developed in the laboratories of the same pharmaceutical manufacturer. Out of the profitable industrial experiences with analytical research came the necessary confidence to apply organized research to other industrial needs. Today the large industrial laboratories resemble in every way the scientific campus of the university.

The United States did not lead the world in establishing the industrial research laboratory, but she undoubtedly leads in their present-day recognition. Just forty years ago except in pharmacy and a very few other industries the only research on this side of the water was collegiate. Robert Kennedy Duncan, founder of the Mellon Institute system of Industrial Fellowship research, was the first in this country to succeed in making business aware of this neglected resource lying at their doors, a resource that in Germany had already been taken into partnership with industry and finance. Today there is such an appreciation of the worth of pure science as an industrial tool that it is becoming increasingly difficult to keep good research directors in the universities to carry on instruction and the exploratory researches in pure science that represent the search for the truth as a necessary preamble to its practical application.

Is research merely something nice to have around the college, like a few good pictures in the home? In the sense that a few well-chosen pictures may turn the eyes of the family to better things, the answer is yes. Rather it should be looked upon as a necessary thing. A few weeks ago I expressed to Professor Cook my irritation that a committee of the college association should ask us to suggest Pharmacopoeial problems that require investigation. I can understand how an utter novice in research, a student completely unfamiliar with research methods, may require guidance to prevent his making an unwise choice of a target for his first attempt by reason of his still limited capabilities. But I cannot imagine a man of the mental

stature and maturity associated with high quality teaching, by virtue of his educational field familiar with the material of the Pharmacopœia, who could not for himself pick enough research projects from this text to keep his entire department busy for the next dozen years. The U. S. P., as a primary adjunct to the law of the land, is presumed to carry the most authoritative of scientific information, and it is the constant endeavor of the revision authorities to assure this. If one cannot, from the state of his knowledge, sense the lack of perfection in a technical monograph, we have every right to question his competence to conduct or direct such a research.

In an educational institution, research should be a part of the structure rather than the ornamentation. A keen teacher is an inquiring teacher. His own mental processes are so stimulated that he brings a new inspiration with his teachings. His students look forward to his lectures rather than backward at old question lists. There must be a proper preservation of a balance between the energies expended on research and teaching. Since a college of pharmacy is primarily an undergraduate school, nothing must interfere with the quality of teaching. In such a school, therefore, one cannot use the publication yardstick as the sole measure of faculty accomplishment. There are many problems in student behavior yet unsolved. There are wide differences of opinion as to the most appropriate content of the pharmaceutical curriculum. Students of educational methods are by no means agreed upon the most effective presentation of pharmaceutical subjects in classroom and laboratory. I would honor just as greatly the mastery of the teaching art as the mastery of a law of science.

Many times laboratory directors express their regret that the pharmaceutical industry has not absorbed more pharmaceutical scientists. Usually with ample justification they toss the blame back where it belongs, with the colleges. We have had an economic revolution in pharmacy. This college was founded in a day when the pharmacist was almost self-contained. We now have a new materia medica. The galenicals of the old Pharmacopœia were the finest of their kind. But the finest extract is loaded with physiologically inert material. The preparations are unstable as well as diluted, and because of many natural factors are variable in potency. No sense of nostalgia should ever be allowed to build a resistance against either a highly purified educt or a synthetic equivalent, especially when

synthesis can beneficiate the behavior of the replacement. Manufacturing pharmacy today is a series of engineering operations, guided by highly skilled specialists, and piloted by the best research workers in America. Such needful persons must be hired when they can be found, and it is the fault of pharmaceutical education if its own students do not flow into these positions. I doubt if there is any research director, for example, so bigoted that he would turn his back on brilliant pharmaceutical investigators whose training stemmed directly from pharmacy.

In every research laboratory we have many assistants. There is more handwork than brainwork in research, and the lack of adequate assistance severely reduces the output of a good brain. Most of these assistants, distinguished from the technicians, are apprentices in every sense of the word. When released from their indentures, they become the journeymen and finally the masters of science. Students in pharmacy receive one of the very best of manipulative trainings. They are among the very best of raw material for apprenticeship to this scientific age of ours. If our faculties are not strong enough to develop these apprentices, we must strengthen the faculties. If we raise our educational sights to encompass the research needs of pharmacy we can at the same time beneficiate it professionally. Pharmaceutical education and pharmaceutical practice of tomorrow are being determined by the students that are taught today. The trends in medicine, the success in treatment of disease through the very recent discoveries of the research laboratory, show us what public health is to require of its servants. You students and teachers have it in your power to meet this challenge; otherwise you are tradesmen.

# MEDICINE, PHARMACY AND TOMORROW'S HEALTH

By Edward L. Bortz, M. D.*

"PHARMACY is an important branch of the Science of Medicine. Deposited by the division of the science in the hands of the Apothecary, it requires, on his part, intelligence, skill and integrity to prepare and compound medicines for administration to the sick; to distinguish and select those drugs that are of the best quality, and possessed of those virtues on whose efficacy reliance is placed to cure diseases, and to deal in no others. On the qualifications of the Apothecary in these respects must depend, in no small measure, the success of the Physician and his practice, and often the lives of his patients."

On the one hundred and twenty-fifth anniversary of your great institution I open my remarks by a quotation from the preamble to your Constitution, written one hundred and twenty-five years ago. I am grateful to you for the honor and privilege of participating in this celebration. Your institution has been the spearhead, the fountain of knowledge, and inspiration for the science of Pharmacy in the United States. Your graduates have distinguished themselves in many diversified fields within the realm of medical science. Throughout the vigorous lifetime of this venerable College many students of medicine have sought guidance and instruction in your lecture halls and laboratories. In fact, it is stated that during the first century of the College approximately twenty thousand students attended all, or a part of the courses, and of these only seven thousand five hundred were graduated.

## Sentinels

Let us be frank and accept the fact that the curriculum for the medical student is so solidly packed with instruction in the structure and function, normal and abnormal of the various tissues and organs of the human body that very little time is available for instruction in the art and science of prescription writing, not to mention compati-

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bilities, incompatibilities, and the compounding of various important chemicals which, when correctly fulfilled, results in a medicinal preparation destined to correct some bodily infirmity. Many an intern has gleaned important pharmacological knowledge from a hospital apothecary. I recall, with a grateful heart, the many contacts I had, in my early days, with Mr. John Thum, of the Lankenau Hospital, who wisely guided my hand, and mind, in the mysteries of proper and appropriate pharmacal therapeutics.

The doctor is charged with a heavy responsibility when directing the management of his various patients in their return to sound health. What a comfort for the busy doctor to realize that, as his colleague, he has an ally well trained in the basic field of pharmacology, who checks each item he assigns in the prescription. And, in passing, let us here pay tribute to the more than human degree of tolerance, understanding, tact and ability on the part of the friendly pharmacist who can correctly interpret the handwriting of professional men who claim the distinction of belonging to the most learned and useful of all professions. I have made note of the apothecary as a sentinel, and as a friend, to the practicing physician at this time because too often his quiet support of the medical profession has been taken for granted and gone unrecognized.

### Extending Horizons in Pharmacy

As science extended its frontiers, your College was in the forefront in offering instruction of high quality, not only in Pharmacy, but in Chemistry, Bacteriology and Biology. Training in these basic medical sciences is invaluable in fitting students for important assignments in schools, laboratories and research institutes, where investigations of the utmost importance to mankind are being carried on. Two of your graduates are working in our Research Institute at the Lankenau Hospital at the present time; one working on human chromosomes, and another, aiding in the study of effect of enzymes on heredity.

### Whither Medicine, Whither Pharmacy

On the happy occasion of an important anniversary, as you are celebrating today, it is appropriate for an examination of the trend of the times, and a perusal of the road ahead, and a look at the signposts as the milestones roll by.

Accomplishments in the fields of Medicine, Pharmacy and Public Health have brought about an extension in the life span, from approximately forty-five, at the turn of the century, to something over sixty-two years, as the average life expectancy for today. Consequently, more people are living into, shall we say, the more mature years of human existence. One dislikes to mention "old age." The major threats to folks during the later years in life are arteriosclerosis, with deterioration in the structure and functional capacity of heart, brain, kidneys and peripheral vessels.

Cancer is another scourge; tuberculosis has yet to be challenged. Yet, Science is on the march, and an examination of your curriculum, as of today, demonstrates splendid opportunities for training in physics, chemistry, physiology, biology, public health, pharmacology, biological assaying—even mathematics. I shudder to mention the term! Experience in these fundamental disciplines adequately prepares your graduates to play roles of commanding importance in the spectacular drama of man's fight to conquer those conditions which impair and too often cut short the career and lives of men and women, in their most productive years. Your distinguished faculty is in the midst of the battle, and as they train their students for participation in this great work, they are making a contribution to the enrichment of human existence.

Note the dramatic advances of the last few years. Chemotherapy, in the realm of sulfonamides, penicillin, streptomycin, and kindred products, has saved countless lives. The newer knowledge of nutrition, and the ultimate synthesis of the vitamins promises aid in reinforcing human tissues where they are wont to give way under stress and strain. The realm of the endocrines is rapidly producing facts of the greatest value for many suffering individuals. The cretin can be brought to normal with a bit of thyroid; equally happy results have taken place, with alterations, under the functioning of the pituitary, the adrenals and the gonads. Cancer must ultimately reveal its secrets to the light of day, under the steady scrutiny of eager scientists who will some day find ways and means to curb the devastations of this great "killer." I believe, too, that the ravages of tuberculosis, and venereal disease, can all be eradicated with the intelligent application of known facts which your faculty and student body are in possession of, and who function as allies of the medical profession.

### Preventive Medicine Steps Forward

Until comparatively recently doctors and pharmacists, chemists and assayists busied themselves in combating the destructiveness of far-advanced disease and disorder. More and more in keeping with the trend of man's search for a better way of life the principles of preventive medicine assume important proportion. As brothers in medical science we are directing our energies towards the detection of diseases in their incipiency, and in an effort to correct conditions which, if uncontrolled, might lead to disaster. An ounce of prevention still has its value, but the principle is more generally accepted throughout the civilized world. Vaccines and antitoxins, which you prepare for us, and biologicals of various kinds, extend the benefits of good health to countless thousands who fifty years ago would have been early candidates for "grave-diggers."

### The Atomic Age

Within the last year two bombs were dropped with world-wide repercussions, and all of a sudden the "Atomic Age" was upon us. But, for more than half a century, man has participated in the benefits of radiation therapy. And today, in the realm of the isotopes, a new era is born. Exquisite refinements in methods of study of metabolic processes, and the physiology of digestion, the functioning of the various glands, and the ultimate destiny of the various chemicals which we absorb, as food, render former methods of study antiquated. Your students are going to hear more of isotopes in the near future; at least, so I predict, in their courses in chemistry and biology, of radioactive iodine, phosphorus and carbon 13.

Radioactive iodine introduced into the body soon lodges in the thyroid gland, as revealed by the Geiger counter. Radioactive phosphorus has been used in the treatment of certain leukemias with promising results, and now carbon 13 is being followed through the body as a tracer to outline important intermediate steps in the catabolism of carbohydrates. And, just to think, this new field of tagging atoms and tracing them through the body is only beginning. Far-reaching advances in our knowledge of both the normal and the abnormal experiences of the human body appear to be on the way in the next ten years. The realm of the microcosm is yielding secrets of inestimable value to the life of our fellow men.

## Enriched Existence

Only recently I have returned from Japan, a feudal nation, brought to the abyss of destruction by a military caste which derived its power from fear, ignorance and fanaticism. I found there ample evidence that the beneficent effects of modern medicine and pharmacy were foreign to the nation. To begin with, life itself is a cheap commodity, since the land is terribly over-populated. Patent medicine advertisements are splattered over the countryside, and the doctors and nurses were using methods of treatment which we discarded more than a quarter of a century ago. In returning to our great land, by air from Tokyo, it was as though one were just awakening from an evil dream. Here, in spite of the war, Science has made great strides. New techniques and methods are being evolved by our teachers and investigators, and these are promptly passed on to eager students. A better way of life is ours for the asking. True, we are in the throes of the readjustment period. It is fitting, therefore, that on this joyous occasion, your one hundred and twenty-fifth anniversary, you should gather together and review your great accomplishments and study the stars that chart tomorrow's journey with the guiding hand of your brilliant President, supported by an alert board of directors, and directed in action by a renowned faculty.

You are facing unparalleled opportunities in the realm of applied Science. Your experiences in the years to come are bound to be tremendously different from those of the last twenty-five years. We are indeed living in an exciting day. On this brilliant occasion, in full light of rich accomplishments, I offer you my congratulations.

# SELECTED ABSTRACTS

**An Assortment of Useful Preparations.** W. Swallow. *Pharm. J. 102,* 11 (1946). The following preparations are stated to have proved satisfactory in hospital practice:

*Lime Syrup.* This is useful for patients who need copious fluids, and is a good vehicle for glucose. One or two teaspoonfuls of the syrup may be added to a tumblerful of water. It contains lime essence No. 1 (W. J. Bush), 150 minims; citric acid, 1 oz.; elixir of saccharin, 360 minims; syrup, to 8 fl. oz.

*Camphor Cream.* This cream is recommended for its soothing and protective action on the hands. It contains camphor, 10 gm.; peanut oil, Lanette wax SX, and soft paraffin, of each 20 gm.; water, to 100 gm.

*Emulsifying Ointment Base.* This preparation is recommended for general use, and is the base of the creams described below. It is comprised of Lanette wax SX, 20 gm.; liquid paraffin, 65 gm.; soft paraffin, 35 gm.; glycerin, 30 gm.

*5-Aminoacridine Cream.* This flavine preparation, containing the drug in a concentration of 1:1000, is non-staining. It is useful in the treatment of small lesions infected by organisms of low pathogenic nature.

*Chloramine Cream.* A 4 per cent chloramine cream is recommended as a dressing for areas with sloughs of dead tissue. It is stated to be superior to eusol in that it permits easier removal of dressings. The cream should not be used if more than fourteen days old.

*Propamidine with 5-Aminoacridine.* This cream, which contains propamidine isothionate and 5-aminoacridine hydrochloride, 1:1000 of each, is efficacious in combatting streptococcal and staphylococcal infections. Its use for periods of time in excess of ten days is not recommended, in order to avoid irritation of the tissues.

*Nupercaine Burns Cream.* This cream produces prompt analgesia and promotes healing when applied to burns and scalds of small area. It contains nupercaine and 5-aminoacridine hydrochloride, of each 0.1 per cent; sulfanilamide, 3 per cent; emulsifying base, q. s.

*Marfanil Cream.* Clinical trials on a small number of patients indicated that a marfanil cream of 5 or 10 per cent strength was effective in treating streptococcal, staphylococcal and *Ps. pyocyanea* infections. Marfanil is unique among the sulfonamides in that it is not inactivated by pus.

*Phenoxetol Cream.* This preparation, in 2 per cent strength, has been satisfactorily used in a sterile form as a base for penicillin. It has also been used, with varying success, in treating lesions infected with *Ps. pyocyanea.*

*Colloidal Iron Mixture.* This preparation, containing about 2 grains of iron per fluidrachm, is stated to be palatable and well tolerated. It contains "Colliron" (Evans), 20 minims; raspberry essence (W. J. Bush C3670), 1/4 minim; solution of Bordeaux B, 2 minims; syrup, 30 minims; water, to 1 fluidrachm.

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**TDE, 1,1-Dichloro-2,2,-bis (p-chlorophenyl) ethane, as an Anopheline Larvicide.** C. C. Deonier and H. A. Jones. *Science 103,* 13 (1946). The abbreviation TDE is suggested for the generic name "tetrachlorodiphenylethane," a compound more exactly designated as 1,1-dichloro-2,2-bis (*p*-chlorophenyl) ethane.

The comparative toxicity of DDT and TDE in acetone suspensions, dusts and fuel-oil solutions was studied on fourth instars of *Anopheles quadrimaculatus.*

No significant difference was noted between the two compounds in the initial kill of larvae treated with acetone suspensions containing 0.0050, 0.0033, and 0.0025 p. p. m. of each drug. TDE was found, however, to possess a greater residual toxicity than DDT, when applied in a concentration of 0.01 p. p. m. The average time for complete knock-down of larvae was 0.81 hour and 1.166 hour for TDE at this concentration.

When impregnated on talc in a 0.1 per cent strength and applied as a dust, TDE had a toxicity equal to, or greater than, that of DDT.

TDE in fuel-oil solution appeared to be definitely more toxic to anopheline larvae than DDT. These tests were carried out by spraying 0.4 ml. of a 5 per cent solution of the compound into a chamber (8 x 8 x 8 ft.) containing small vessels holding the larvae. The DDT spray produced an average mortality of 76.6 per cent in forty-eight hours; TDE gave 100 per cent mortality in twenty-four hours.

**A Gastric Mucigogue Action of the Alkyl Sulfates.** H. Shay, S. A. Komarov, H. Siplet and S. S. Fels. *Science 103,* 50 (1946). The authors have confirmed the observation of other investigators that sodium alkyl sulfate inactivates pepsin *in vitro* without altering the pH of the solution, but failed to obtain *in vivo* the beneficial results claimed by others to have been noted in dogs with experimentally produced gastric ulcers and in clinical trials on patients.

In work to be published elsewhere, the authors noted that the administration to rats of either sodium dodecyl sulfate ($C_{12}$) or sodium "Lorol" sulfate (a mixture containing chiefly $C_{12}$, plus some $C_{14}$ and $C_{16}$) produced a copious gastric secretion rich in mucus.

The present paper reports the results of the administration of the two products mentioned to dogs. The animals were fasted under nembutal anesthesia, and the stomach was isolated by ligation of the esophagus in the neck, in conjunction with ligation of the pylorus either alone or with an additional ligature around the antrofundal juncture. The whole stomach or the pyloric compartments were fistulized, after which they were lavaged until clear.

A control specimen of gastric mucus representing one hour's secretion was then collected. A 2 per cent aqueous or saline solution of the alkyl sulfate was introduced through the fistula, the quantity being sufficient to fill the whole stomach or pouch at a pressure of 5 to 6 cm. of water. After one to one and one-half hours, the contents were drained, collected, and the alkalinity, pepsin and pH determined.

When the fluid instilled was hypotonic, a 7 per cent decrease occurred in the volume of gastric contents. It was noted that the latter contained a considerable amount of chloride, even in cases where none was administered. The gastric contents were quite viscous, containing 0.21 per cent mucus in one experiment. The secretion of mucus was observed to continue at a high but gradually diminishing rate for several hours following the removal of the drug. It is believed that the mechanism stimulating the mucus secretion is local; atropinization of the animal did not appreciably affect its production.

Since the alkyl sulfates have a mucigogue action and the ability to inactivate pepsin under certain conditions, the authors conclude that they hold promise for the treatment of "peptic" ulcers, provided that a suitable mode of administration can be devised.

# BOOK REVIEWS

**Uranium and Atomic Power.** By Jack DeMent and H. C. Dake. Chemical Publishing Co., Inc., Brooklyn, N. Y.

"Uranium and Atomic Power" is a very timely book. With the setting off of the atomic bomb, the world has become conscious of Uranium. Most any question anyone would like answered about Uranium—censorship permitting—can be found answered within the 343 pages of this book.

Uranium not only is described Physically and Chemically, but is traced from how they test the many ores, and where the ores are found, to the separation of the isotopes of the metal. The Analytical Chemist and Physicist should find the last two chapters on Uranometry valuable. The authors have spent considerable time giving in detail—old and new, qualitative and quantitative, expensive and inexpensive—ways of analyzing for Uranium.

Many interesting facts about the possibilities for the use of Uranium for constructive purposes are included. To finish off their book the writers have an Appendix which includes many handy tables and a short article about the manufacture of the Atomic Bomb.

R. N. JONES.

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**New Drugs.** By Arthur D. Herrick. 319 pages. Revere Publishing Co., 11 Stone St., New York. Price: $4.00.

The passage of the Food, Drug and Cosmetic Act in 1938 placed upon the several industries involved new responsibilities which heretofore had been only moral and with no basis of law. Since 1938 many official interpretations of the law and changes in policy have taken place so that the manufacturer or seller of drugs is now confronted with a rather complex situation which is frequently difficult to comprehend. Among the various sections of the Food, Drug and Cosmetic Act, 505, relating to new drugs, is the one which requires careful study and understanding if new products are to be released with full compliance with the regulations and with a minimum of delay and difficulty.

The author who has had wide experience in the legal aspects involved in new drug procedures has done an admirable job of outlining the exact steps involved and just what difficulties may ensue and how they should be handled. This is by no means a simple matter as the text bears out.

The Appendix contains some very useful data on new drug requirements enacted by numerous state and municipal governments and in addition the regulations adopted by the Council on Pharmacy and Chemistry of the American Medical Association for products that are to be presented for Council acceptance.

Legal departments of the larger companies will find this book useful but even more so will those, who as pharmacists or chemists in the employ of smaller concerns, must guide their new products into drug channels through the legal complications that are by necessity imposed upon them.

This book is indeed one that supplies a definite need and one well worth serious consideration for every well rounded pharmaceutical library.

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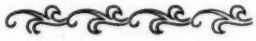

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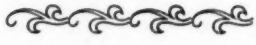

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